CLAIMS

What I claim as my invention is:

1. A drawing process for producing an optical fiber comprising the steps of:

   measuring the outer diameter/shape of a preform;

   heating and melting said preform for said optical fiber;

   while heating and melting, drawing said optical fiber from said preform under tension to form said optical fiber; and

   providing a control system with the measured outer diameter/shape data of said preform to control said drawing process;

   whereby said optical fiber drawing process will be robustly controlled with high performance of said process and high quality of said optical fiber, making a robust diameter-controlled optical fiber against various deviations of said preform diameter/shape.

2. The process for producing said optical fiber as claimed in claim 1, wherein the measurement of said preform outer diameter/shape is either on-line or off-line; and

   in the former the measured data are on-line real-time fed to said control system while in the latter the measured data are pre-stored in said control system, for controlling said process in face of the deviations of said preform diameter/shape.

3. The process as claimed in claim 1, wherein said measured outer diameter/shape data of said preform are fed to said control system to control the process, including all or either one of the following controls:

   a feeding speed control of said preform, a drawing speed control of said optical fiber, and a tension control of said optical fiber.

4. The process as claimed in claim 1, further including the steps of:

measuring the outer diameter of said optical fiber at a safe position below and close to the heating and melting device, in which the size of said preform is changing substantially to form said optical fiber by drawing; and

providing said control system with the measured outer diameter data of said optical fiber to control said drawing process;

whereby to maintain robustly high performance of said drawing process and to provide robustly high quality of said optical fiber in presence of the deviations of said outer diameter and shape of said preform.

5. The process as claimed in claim 1, further including the steps of:

measuring the outer diameter of said optical fiber as it is being drawn at a position at which shrinkage of the outer diameter of said optical fiber is within a small percentage;

providing said control system with the measured outer diameter data of said optical fiber; and

the drawing being carried out at a drawing rate that is controlled based on the measurement data and the deviations of the measured preform outer diameter and the measured optical fiber outer diameter from their respective preselected outer diameters.

6.

7. A drawing process for producing an optical fiber comprising the steps of:

heating and melting a preform for said optical fiber;

while heating and melting, drawing said optical fiber from said preform under tension to form said optical fiber;

after heating and melting, coating said optical fiber while drawing;

measuring the outer diameter of said optical fiber just before said coating stage, called a final

outer diameter of a bare fiber which is said optical fiber before coating; and

providing a control system with the measured final outer diameter data of said bare fiber for controlling said drawing process;

whereby to maintain robustly high performance of said drawing process and to provide the robustly fine quality of said optical fiber, including a real control quality of said final outer diameter of said bare fiber, which is the key quality of said optical fiber.

8. The process as claimed in claim 7, wherein said control system includes at least one of the following controls, a feeding speed control of said preform, a drawing speed control of said optical fiber, and a tension control of said optical fiber.

9. The process as claimed in claim 7, further including the steps of:

measuring the outer diameter of said preform before said heating and melting; and

providing said control system with the measured outer diameter data of said preform and the final outer diameter data of said bare fiber to control said drawing process for robustly controlled high performance of said optical fiber drawing process and said optical fiber.

10. The process as claimed in claim 7, further including the steps of:

measuring the outer diameter of said bare fiber at a position below and close to the heating and melting device in which the size of said preform is changing substantially to form said optical fiber by drawing; and

providing said control system with the outer diameter data of said bare fiber close to said heating device and the final outer diameter data of said bare fiber close to said coating stage to control said drawing process.

11.

12. A drawing process for producing an optical fiber comprising the steps of:

heating and melting a preform for the optical fiber;

while heating and melting, drawing said optical fiber from said preform under tension to form said optical fiber;

after heating and melting, coating said optical fiber while drawing;

measuring the outer diameters of said optical fiber at two or more locations before the coating stage; and

providing a control system with the measured outer diameter data of said optical fiber from said two or more locations to control said drawing process;

whereby to maintain robustly controlled high performance of said optical fiber drawing process and high quality of said optical fiber.

13. The process as claimed in claim 12, wherein the measurements are after said heating and melting and include;

measuring the outer diameter of said optical fiber at a safe position below and close to the heating device with a limited delay from the heating and melting stage; and

measuring the outer diameter of said optical fiber, as it is being drawn, at a second position at which shrinkage of the outer diameter of said optical fiber is within a small percentage; and

the drawing is carried out at a drawing rate that is controlled by said control system based on the deviations of the measurement data from their respective preselected data;

whereby to maintain a control quality of a final outer diameter of said optical fiber before coating.

14. The process as claimed in claim 12, further including a measurement of the outer diameter of said preform above the heating device; and

providing said control system with the measured outer diameter data of said preform and the outer diameter data of said optical fiber at said two or more locations to control said drawing process for robustly controlled high performance of said optical fiber drawing process and said optical fiber.

15. The process as claimed in claim 14, wherein said two or more locations include:

one at a safe position below and close to the heating and melting device; and

another just before the coating stage, therein the measured outer diameter of said optical fiber is called a final outer diameter of a bare fiber which is said optical fiber before coating;

whereby to have a real control quality of said final outer diameter of said bare fiber, which is the key quality of said optical fiber.

16.

17. A control method for an optical fiber manufacturing process control comprising the steps of:

measuring the objects of the manufacturing process by more than one measurement devices which locate at different locations including before and after a stage or an action therein said object changes either its geometrical shape or size, or physical property, or chemical property substantially;

analyzing the measurement data from the measurement devices; and

generating a control signal or control signals to control the optical fiber manufacturing process based on the data and the analysis;

whereby to get robust high performance of the process.

18. The control method in claim17, wherein said optical fiber manufacturing process control is an optical fiber drawing process control and said measurement devices include:

one for the measurement of a preform before a heating and melting stage, in which the preform is changing its geometrical size substantially to form said optical fiber by drawing; and

another for the measurement of said optical fiber after said heating and melting stage;

whereby to robustly control high performance of said drawing process and high quality of said optical fiber by controlling the preform feeding speed and the optical fiber drawing speed based on the measurement data.

19. The control method in claim17, wherein said optical fiber manufacturing process control is an optical fiber drawing process control and said measurement devices include:

one after and near the heating and melting device in which a preform is passing to form said optical fiber by drawing; and

another after the heating and melting device but near a coating stage;

in view of shrinkage of an outer diameter of said optical fiber between these two measurement locations;

whereby to robustly control high performance of said drawing process and high quality of said optical fiber diameter based on the measurement data.

20.